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to which reference was made in these notes in SCIENCE for March 1, has appeared in Part I., Vol. XLIII., of the Annals of the Harvard College Observatory (pp. 33, pls. IV.).

R. DEC. WARD.

SCIENCE AND INDUSTRIAL COMPETITION.

Two small but very significant publications, recently issued from the press, will interest every intelligent citizen, and should particularly interest the man of science, the practitioner in applied science and, perhaps most of all, the always rare but always influential statesman.* The one is a reprint of letters to the *London Times*, the 'Thunderer,' from an able and distinguished British engineer traveling in the United States and reporting to that paper upon the aspects of 'American Engineering Competition'; the other is a series of addresses and magazine articles by Professor John Perry, the able and original electrician and engineer, upon methods of teaching the sciences. There is possibly an important connection between the two seemingly diverse subjects.

The one describes the latest and best, as well as the most important, of American methods and apparatus of industrial production. The universal adoption of scientific methods; the extensive employment of the product of inventive genius; the utilization of applied science in any and every possible way in the promotion of the arts; the adoption of scientific methods of organization, of administration and of maintenance of the great systems of industry, of production, transportation and distribution; the universal faith in and practice of systematic and scientific processes of ore-production and transportation, of trans-shipment, of reduction; the manufacture of iron and steel, 'manufacturing,' all articles made of iron or steel rather than simply 'making' in older way; the part taken by automatic machines in the rapid transformation of the older into the newer system, with

* 'American Engineering Competition,' being a series of articles resulting from the investigations made by the *Times*, London; N. Y. and Lond. Harper & Brothers, MDCCCCL. 8vo., p. 139. \$1.00. 'England's Neglect of Science,' by Professor John Perry, M. E., etc., London. T. Fisher Unwin, 1900. 8vo., p. 113. \$1.00.

resulting increase of product per man, and of wages, and yet with decreasing costs and prices: all these elements of industrial progress are discussed. The other sharply arraigns the English educator for his utter neglect of the applied sciences and for his indifference to their utilization in the life and work of the English people, and attributes the later relative retrograde movement of Great Britain in part, at least, to this neglect of science and to the greater activity and the statesmanlike policies and methods of education of Germany and the United States.

The one traces in a most admirably complete, yet condensed and succinct, way the great movements in the fundamental industries of the United States during the past decades and up to its recent astounding development of a foreign trade. It closes a most intensely interesting and instructive and suggestive discussion by two chapters on the labor question, which this author seems to think a much more important element in the relative decadence of Great Britain as a manufacturing nation than even that neglect of science which has awakened Professor Perry's most serious apprehensions. In the other book, that distinguished electrician criticises, not the science-teacher so much, nor even the leaders in the industrial systems of his country, but the members of his own profession who, as he thinks, are themselves indifferent to the progress of science and to its utilization for the benefit of their country and profession. He criticises the methods usual in teaching mathematics, that ultimate basis of all engineering, and discusses in his characteristically original and forceful manner the defect of technical education in England and the defects of such as is attempted. Outside the work of the Science and Art Department at Kensington, he finds apparently little to approve. For that department he has cordial words of praise. His discussion may be taken as an important supplement to John Scott Russell's famous work.*

After reading these two little volumes one can hardly fail, however, to come to the conclusion that, while it is true that the American producer just now bursting into the field of

* 'Systematic Technical Education,' London, 1869.

foreign consumption with his cheap but well-made 'interchangeable' wares, owes his seemingly meteoric success to applied science and in large part, in these later years, to the introduction into his manufacturing and transportation organizations of scientifically trained men, and while it is unquestionably the fact that Great Britain is suffering from neglect of science, and from the barbarous spirit and ignorance of her trades-unions, the real, the fundamental, element of difference probably lies behind all this. The ultimate cause of these developments of the United States which have so astonished the world is that perfect freedom, political and conventional, that freedom of the individual to mark out his own life and strive for his own highest goals, unhampered by governmental dictation or by bonds of caste, which has given the American citizen hope, ambition, purpose and effective energy. It is this which gave him invention, power of achievement, his patent laws, his legislation in behalf of essential industries, even his alert mind and his patriotism and love of country. It is this which has given us our common schools, which has promoted the organization of schools of the arts and trades and productive professions and the whole system of technical education and of industrially applied science. This has given our capitalist a new use for accumulated wealth in the endowment of schools of science and the promotion of education generally, has induced the adoption of organized industrial systems on such an enormous scale and has permitted the introduction of labor-assisting machinery without serious opposition on the part of those certain to be ultimately most benefited by the resultant increase of wages and decreased costs of product. Great Britain is still under the enslaving influences, in large degree, of convention and caste, and it is mainly this which lies at the bottom of her slow progress in the adoption of modern scientific methods, of improved systems and of extensive and intensive technical education.

Meantime, these two books will serve for the present as admirable summaries of progress to date and, later, will have great value historically.

R. H. THURSTON.

THE MALARIA EXPEDITION TO NIGERIA.*

THE detailed report of the expedition sent out to West Africa last year by the committee of the Liverpool School of Tropical Medicine has not yet been completed, but its main conclusions can now be given. The expedition was under the direction of Dr. H. E. Annett, demonstrator at the Liverpool School of Medicine. Its main objects were: (1) the exploration and investigation of the conditions under which malarial fever occurs and is conveyed to Europeans, (2) the possibility of adopting any preventive measures against the disease, and (3) the corroboration and extension of recent discoveries and researches on the subject. In Nigeria there are no large communities of Europeans such as at Lagos, Accra, Cape Coast and Sierra Leone, but there were from three to ten white men at each of the stations, with the exception of Old Calabar and Lokoja, where they number a hundred or more. The observations of the members of the expedition confirm the recent discoveries regarding the cause of malarial fever and more especially the part played by mosquitoes of the genus *Anopheles* as the carrier of the disease from an infected to a non-infected person. The examination of the blood of the natives themselves corroborated the work of Professor Koch in the East Indies, and of the members of the Royal Society's Commission on Malaria in West Africa, that the blood parasite which gives rise to malarial fever in man is carried by the mosquito from the native to the European—and more especially from the native children. The examination of the blood of hundreds of native children revealed the interesting fact that between 50 and 80 per cent. of those under five years, between 20 and 30 per cent. of ages between five and ten years, and a small percentage over ten years contained malarial parasites, often in very large numbers. The breeding places of the *Anopheles* were found to be chiefly the dug-out native canoes in the regions of the mangrove swamps, claypits and puddles in the forested district, and at Lokoja puddles and ditches on and alongside the roads and footpaths. It was particularly noticed everywhere how carelessness in the construction of roads and footpaths, and more es-

* From the *London Times*.